Fermilab

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FROM: Tim Miller

SUBJECT: Safety Note #11 - An Analysis of Fermilab's Occupational Injury/Illness Data for CY 1984

Attached is a copy of the subject Safety Note for your information.

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Safety Note 11

AN ANALYSIS OF FERMILAB'S OCCUPATIONAL INJURY/ILLNESS DATA FOR CY 1984

T. Miller
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The purpose of this report is to examine Fermilab's occupational injury/illness data for CY 1984 with the intent of identifying relationships which can be exploited to reduce the incidence and severity of future accidents.

As can be seen in Table 1, 501 Fermilab employees went to the Medical Department a total of 604 times for injuries or illnesses which presumably resulted from on site exposures (henceforth referred to as "total cases"). Forty-three of these cases were reported to DOE through the Computerized Accident and Incident Reporting System (henceforth referred to as "reportable cases"). The most common accident type was "struck by or against" (233 total and 11 reportable cases) and the least common was "automobile" (0 cases). Accident types with the greatest reportable to total ratio were "chemical exposure"; "lifting"; and "slip, trip, fall". Nearly one-third of the "chemical exposure" accidents were reported due to the low threshold reportability criteria used for this type of exposure.

Figures 1 and 2 are plots of total cases versus date and reportable cases versus date, respectively, for CY 1981 through CY 1984. In addition to actual data, smoothed values have been graphed (smoothing was accomplished by using the running three month average). It can be seen from the total case history that the rates are generally highest in the summer months. Perhaps this is due to summer employees and/or the different nature of summer work. There is no trend in the annual totals over the graphed period (1981 - 647, 1982 - 629, 1983 - 583, and 1984 - 604). The average number of total cases per month over this period is 51.3 ± 11.7. The reportable case history is more variable, but with a little imagination there appears to be an approximately eighteen month cycle. This may be due to changing reporting criteria as much as anything. Again, there is no trend in the annual totals (1981 - 58, 1982 - 49, 1983 - 31, 1984 - 43). The average number of reportable cases per month over this period is 3.73 ± 3.25. The monthly reportable case rate is not related to the monthly total case rate ($p>0.5$, t-test of regression slope relating these variables).

Table 2 contains monthly totals of accident type for CY 1984. Only four of the ten types show a trend. "Struck by or against", "temperature extremes", and "sharp objects" all peaked during the summer months. "Electrical" peaked in the fall. The first three may be due, again, to summer employees or the nature of summer work.

Table 3 contains injury and illness statistics for the nine divisions/sections of Fermilab for CY 1984. Total case rate and reportable case rate are normalized to 2×10^5 person-hours (100 person-years). Total case rates range from 0.0 (Director's Office) to 40.3 (Technical Support) with the Laboratory value being 25.1. Reportable case rates range from 0.00 (Director's Office and Tevatron 1) to 3.94 (Technical Support) with the Laboratory value being 1.79. Please note that the error in the estimates of the reportable case rates for Lab Services, Physics Section, Research Division, and Safety Section is large (>50%) due to the limited number of reportable cases on which they are based. Recently published reportable case rates include 2.0 for all DOE 1/84 - 9/84, 1.7 for DOE research contractors 1/84 - 9/84, 7.6 for U.S. general industry CY 1983, 14.8 for U.S. construction industry CY 1983, and 2.0 for U.S. office workers CY 1983.

Analysis of the data in Table 3 shows that among divisions/sections, the reportable case rate is unrelated to the total case rate and the number of reportable cases is unrelated to the number of employees ($p>0.3$, t-test of regression slopes relating variables). These results indicate that the severity of injuries/illnesses and the rate of those which are reportable are not constant among divisions/sections.

Table 4 contains an analysis of Fermilab employee case rates for CY 1984. Immediately obvious is that no employee went to the Medical Department more than a total of four times or was involved in more than a total of two reportable cases. At face value it does not appear that employee case rates are an important factor. However, the total number of cases per employee with at least one reportable case is significantly greater than that for all employees reporting to the Medical Department ($p<0.005$, t-test).

Table 5 contains an analysis similar to that for Table 4, but directed to supervisors of employees who reported to the Medical Department. Note that one supervisor was attributed with thirty-one total cases and another with five reportable cases! The mean number of total cases per supervisor having at least one reportable case is 4.65 which is significantly greater than that for all supervisors ($p<0.005$, t-test). Further analysis reveals that the thirty supervisors having at least one reportable case were responsible for 208 (34%) of the total cases occurring at Fermilab for CY 1984.

The results presented in this paper lead to the following recommendations:

1. Emphasis should be given to controlling chemical exposures which are likely to become reportable. In CY 1984 the major problem in this respect was dermatitis caused by exposure to uncured epoxies in Technical Support.

2. Emphasis should be given to the safety of summer employees and jobs which are peculiar to the summer months - perhaps better training for the former and further study and follow-up by operational safety personnel for the latter.

3. Emphasis should be given to reducing injuries and illnesses in the divisions/sections with the greatest total and/or reportable case rates. Perhaps an intensive program of Job Safety Analysis and Job Instructional Training (done properly) would help.

4. Emphasis should be given to improving the safety performance of supervisors who had reportable cases in CY 1984. A program of regular local inspections and close monitoring by the Director's Office will soon be launched for this purpose.

Table 1. Total vs Reportable Cases for Fermilab
CY 1984

Index	Total	Reportable	Reportable Total (%)
Cases	604	43	7.1
Employees	501	42	8.4
Supervisors	232	30	12.9
Accident Type			
Slip, Trip, Fall	85	8	9.4
Chemical Exposure	35	10	28.6
Struck By, Against	233	11	4.7
Lifting	64	7	10.9
Caught Between	48	3	6.3
Automobile	0	0	-
Temperature Extreme	23	1	4.3
Sharp Object	90	3	3.3
Electrical	4	0	0
Other	22	0	0

Figure 1.

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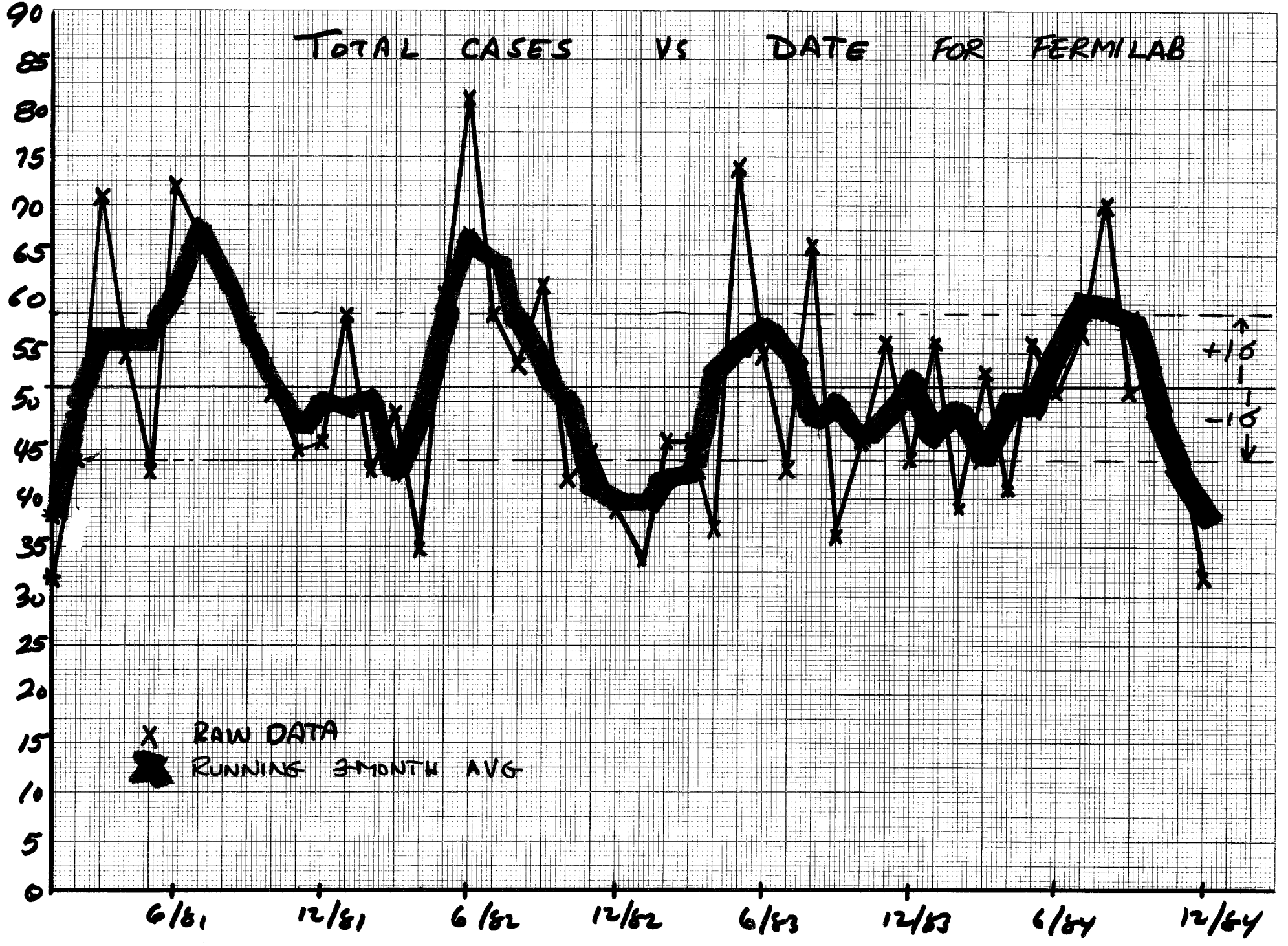

Figure 2.

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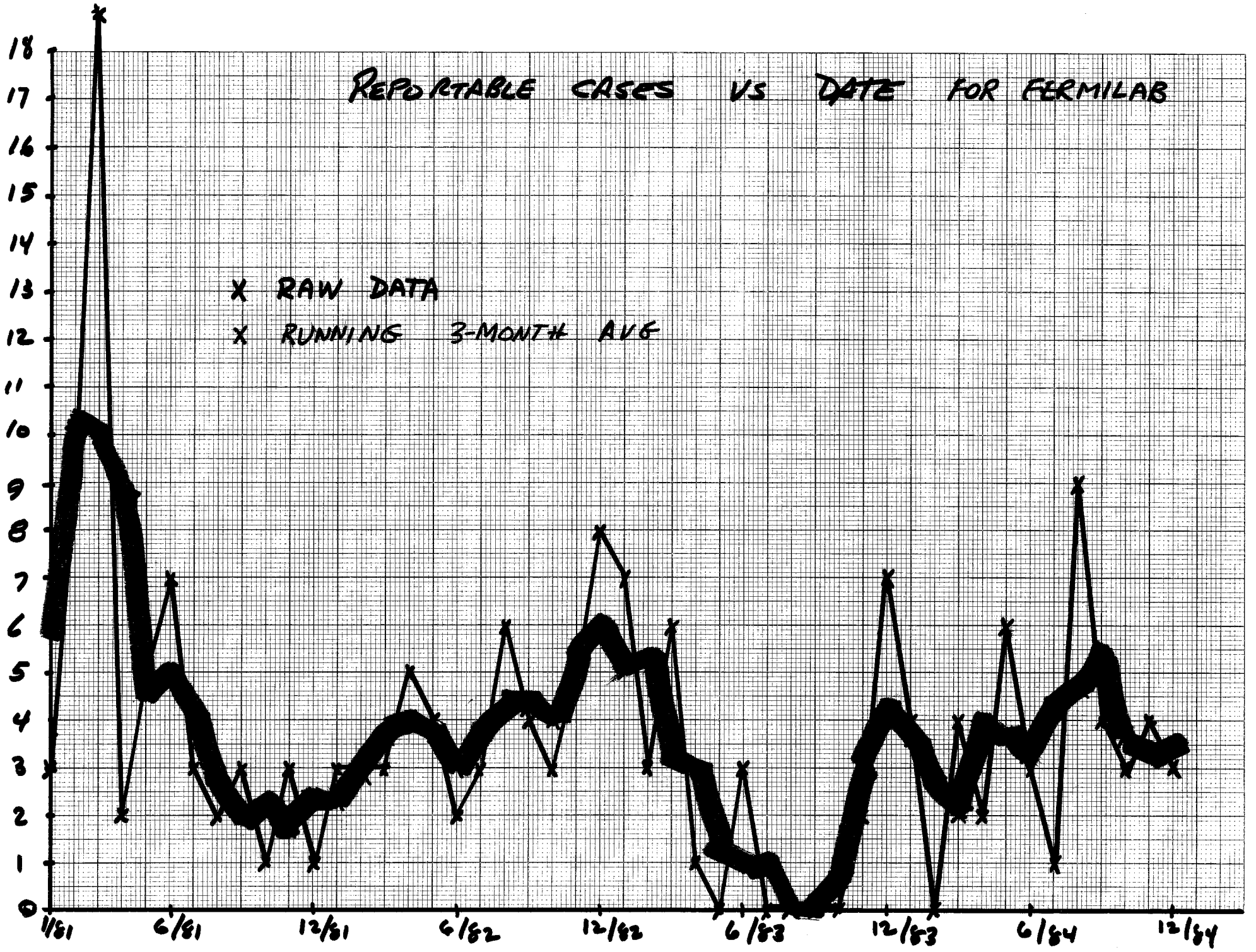

Table 2. Monthly Totals of Accident Type for Fermilab
CY 1984

Date	Slip, Trip, Fall	Chemical Exposure	Struck by, Against	Lifting	Caught Between	Auto-mobile	Temper-ature Extreme	Sharp Object	Elec-trical	Other
01/84	15	6	21	10	1	0	1	2	0	0
02/84	7	2	22	4	1	0	0	1	0	2
03/84	9	2	17	5	4	0	4	8	0	4
04/84	2	1	22	5	6	0	1	3	0	1
05/84	8	4	23	6	5	0	1	8	0	1
06/84	7	7	17	3	2	0	1	13	0	1
07/84	7	1	20	6	4	0	3	14	0	2
08/84	2	5	27	10	7	0	6	12	0	1
09/84	6	3	24	1	6	0	0	10	0	1
10/84	7	3	19	5	5	0	4	5	1	4
11/84	7	1	11	8	5	0	1	5	3	4
12/84	8	0	10	1	2	0	1	9	0	1

Table 3. Division/Section Injury and Illness Statistics for Fermilab CY 1984

D/S	Total Cases	Reportable Cases	Reportable Total (%)	Hours Worked ($\times 10^5$)	Total Case Rate	Reportable Case Rate
AD	105	8	7.6	9.36	22.4	1.71
BS	116	6	5.2	8.18	28.4	1.47
DO	0	0	---	1.60	0.0	0.00
LS	26	2	7.7	1.77	29.3	2.26
PS	25	1	4.0	1.75	28.6	1.14
RD	101	3	3.0	11.99	16.8	0.50
SS	5	1	20.0	0.63	15.8	3.17
TS	225	22	9.8	11.16	40.3	3.94
T1	1	0	0.0	1.62	1.2	0.00
Lab	604	43	7.1	48.09	25.1	1.79

Table 4. Fermilab Employee Case Rates for CY 1984

Rate	Geometric Mean	Range	Sample Size
Total Cases per Employee	1.14 $\overset{\times}{\div}$ 1.35	1-4	501
Total Cases per Employee having $\geq$1 Reportable Case	1.44 $\overset{\times}{\div}$ 1.57	1-4	42
Reportable Cases per Employee having $\geq$1 Reportable Case	1.02 $\overset{\times}{\div}$ 1.11	1-2	42

Table 5. Fermilab Supervisor Case Rates for CY 1984

Rate	Geometric Mean	Range	Sample Size
Total Cases per Supervisor	1.73 $\overset{\times}{\div}$ 2.15	1-31	232
Total Cases per Supervisor having $\geq$1 Reportable Case	4.65 $\overset{\times}{\div}$ 2.34	1-31	30
Reportable Cases per Supervisor having $\geq$1 Reportable Case	1.29 $\overset{\times}{\div}$ 1.20	1-5	30